

REMARKS

This application has been reviewed in light of the Office action dated February 14, 2005. Claims 1-9, and 21-27 are pending in the application; claims 10-20 have been cancelled without prejudice. Claims 23-27 have been added. Claims 21 and 22 were previously added, but were not considered by the Examiner. No new matter has been introduced. The Examiner's reconsideration of the rejection in view of the amendment and the following remarks is respectfully requested.

By the Office Action, claims 1, 3, 4, 8 and 9 were again rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent Application Publication No. 2002/0102826 A1 to Shimamoto et al. (hereinafter Shimamoto). The Applicant respectfully disagrees with the rejection.

Shimamoto is directed to a method for creating a Ru electrode for a capacitor. The electrode is formed by a CVD process with a low amount oxygen. In this way, the Ru layer does not supply damaging oxygen to the adjacent barrier layer after fabrication of the device.

In Shimamoto, the electrode is formed in a low oxygen content environment. This low oxygen content in the Ru electrode of Shimamoto is to protect the adjacent barrier layer, which is not formed of Ru or Re nor even implied to be. The concept is to EXCLUDE damaging oxygen from being included in the Ru ELECTRODE, not to prevent diffusion through the electrode. The oxygen normally diffuses out of the Ru electrode and damages the barrier layer surrounding the electrode resulting in poor performance of the capacitor, which is formed by the electrode. The barrier layer suggested in Shimamoto does not include nor suggest Ru or Re.

Nowhere in Shimamoto is a barrier layer disclosed or suggested which includes a metal form of Ru or Re.

The Ru electrode of Shimamoto is an ELECTRODE. The electrode DOES NOT PREVENT diffusion between materials. The electrode of Shimamoto does not even remotely suggest using Ru as a barrier layer. The Examiner incorrectly assumes that since the material is the same, the electrode in Shimamoto can be used as a barrier layer. This is not correct since barrier layers are thin layers used to prevent diffusion of materials between components having high concentrations of elements, such as an electrode. The diffusion barrier (e.g., TaN) is to prevent this from happening. A Ru barrier layer is not contemplated or implied by Shimamoto.

The electrode of Ru in Shimamoto is not a barrier layer, it is an ELECTRODE. Barrier layers are well-defined in the art and have a particular function. The function, the structure and the fabrication of a barrier layer and an ELECTRODE are completely different. The common material, Ru, being employed in the electrode in Shimamoto does not contemplate its use as a barrier layer. The use of the electrode in Shimamoto as a barrier layer is neither taught nor suggested. In fact, due to the processing difficulties of Ru, the use of this material as a barrier layer is not contemplated by the prior art.

The Examiner is respectfully requested to reconsider his position and withdraw the rejection, as Shimamoto fails to even remotely disclose or suggest the present claims.

Claim 1 of the present invention, includes, *inter alia*, a barrier layer formed between the first material and the second material to prevent diffusion between the first material and the second material, the barrier layer includes a metal form of at least one of Ru and Re.

Nowhere in Shimamoto is a barrier layer formed between the first material and the second material to prevent diffusion between the first material and the second material, where the

barrier layer includes a metal form of at least one of Ru and Re disclosed or suggested.

Reconsideration of the rejection is earnestly solicited for at least the reasons stated.

By the Office Action, claims 2 and 5 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Shimamoto in view of U.S. Patent Application Publication No. 2002/0197856 A1 to Matsuse et al. (hereinafter Matsuse). The Applicant respectfully disagrees with the rejection.

Matsuse describes a method of forming a barrier layer and includes Ru in a nitride form. RuN_x is a dielectric material. Matsuse fails to disclose or suggest the use of a metal form of at least one of Ru and Re as a barrier layer. As such, Matsuse fails to cure the deficiencies of Shimamoto. Therefore, the cited combination, with references taken singly or together, fails to disclose or suggest a barrier layer formed between the first material and the second material to prevent diffusion between the first material and the second material, the barrier layer including a metal form of at least one of Ru and Re as recited in claim 1. Claims 2 and 5 are believed to be in condition for allowance at least due to their dependency from claim 1. Reconsideration of the rejection is earnestly solicited.

By the Office Action, claims 6 and 7 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Shimamoto. The Applicant respectfully disagrees with the rejection.

Initially, claims 6 and 7 are not believed to be product by process claims. The temperature ranges given in the claims refers to the metallic phase of the metal provided in the barrier layer not necessarily how to form the layer.

In addition, claims 6 and 7 are believed to be in condition for allowance for at least the reasons stated above. Reconsideration is earnestly solicited.


The Examiner has not considered claims 21 and 22 which were previously submitted with the last office action. The Examiner is urged to review and allow these claims.

Claim 1-9 and 21-27 are pending in the case. Claims 23-27 have been added. The examiner is asked to carefully review the case, considering the language of ALL the claims.

In view of the foregoing amendments and remarks, it is respectfully submitted that all the claims now pending in the application are in condition for allowance. Early and favorable reconsideration of the case is respectfully requested.

With the addition of a fourth (4th) independent claim a fee of \$200 is due; the office is authorized to charge the fee of \$200 to applicant's IBM Deposit Account No. 50-0510.

Respectfully submitted,

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